



## BACKGROUND OF THE INVENTION

The present invention relates to an instrument for periodontal treatment, and more particularly, to an instrument which permits scaling and root surface treatment for the purpose of cleaning periodontal pockets.

Instruments of this type, such as manual curettes, or inserts mounted on vibratory handpieces, are already known. However, the rigidity of the known instruments does not permit treatment of the periodontal pockets, or satisfactory cleaning of the furcations, thereby forcing the practitioner to use traditional methods of periodontal surgery involving the cutting of flaps.

An instrument which has made it possible to overcome the aforementioned disadvantages is also known, in particular, from EP 0 715 508 B1. The disclosed instrument comprises a shank and a blade. The blade has an active part with two sectors distributed along the blade, each of which is situated on either side of a plane passing through the axis of the blade, and the two sectors have different levels of aggressiveness. As a result, during treatment and with the instrument introduced into the periodontal pocket, the more aggressive sector comes into contact with the root surface of the tooth, and the less aggressive sector comes into contact with the mucosa. The blade is held, by way of its shank, on a handpiece which imparts a

vibratory movement to the blade in order to allow both sectors to detach tartar to be removed.

Although the disclosed instrument is satisfactory, it continues to be the subject of refinements for improving the comfort for both the patient and the practitioner.

### **SUMMARY OF THE INVENTION**

To this end, and in accordance with the present invention, an instrument for periodontal treatment is provided which comprises a blade integrally connected to a head for coupling the blade to a handpiece so as to impart a vibratory movement to the blade. An active part is distributed along the blade on a side of the blade which is defined by a plane passing through the axis of the blade. The blade is additionally provided with an irrigation channel for liquid, arranged at the center of the blade. The channel opens out at the center of the active part of the blade, along the major part of its length, to ensure, on the one hand, cleaning of the active part of the tool during a procedure and, on the other hand, removal of the detached particles.

In accordance with the present invention, the blade is advantageously provided with a plane which intersects with the channel, thereby providing an opening for the channel on the active part. The intersecting plane is inclined with respect

to the axis of the blade and defines the active part of the blade. A plurality of notches, or some other similar configuration, is arranged on each side of the opening of the channel to provide a surface roughness which is adequate for use of the blade.

Various alternative embodiments of the instrument of the present invention can be provided.

For example, in one alternative embodiment, the end of the blade has a curvature. In another alternative embodiment, the end of the blade can be curved by the practitioner for adapting the blade to the particular treatment which is being performed, for example, for access to the furcations.

Further in accordance with the present invention, the blade is mounted on the head in an articulated manner, for example, by means of a hinge of the ball-and-socket type. This allows the position of the active part of the blade to be oriented with respect to the grip of the apparatus.

In another alternative embodiment, the end remote from the active part of the blade is provided with a means for detachable fixation to the head of the instrument. For example, such detachable fixation of the blade can be accomplished with a bushing which can be maneuvered, in particular, by the practitioner. The blade is then integrally connected on the bushing. The bushing is additionally provided with an annular groove which, in a position mounted on the head, forms a

leak-tight annular chamber for communication between the irrigation channel of the blade and a delivery channel for liquid arranged on the head.

The head is advantageously provided with a channel for the delivery of liquid which is linked to the irrigation channel of the blade. The entry point for the liquid can be external or internal to the handpiece.

The above-mentioned characteristics of the present invention, in addition to other characteristics which will become apparent to the person of ordinary skill, are discussed in the detailed description of illustrative embodiments which is provided hereafter, with reference to the following drawings.

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

Figure 1 is a side view of an instrument of the present invention.

Figure 2 is a view similar to Figure 1, illustrating an alternative embodiment of the present invention.

#### **DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS**

Figure 1 shows an instrument for dental surgery, in particular, an instrument for periodontal treatment. The illustrated instrument comprises a blade 1, which is also

referred to as an insert, integrally connected to a head 2. The head 2 is removably and interchangeably coupled to a handpiece (not shown).

In the embodiment shown, the blade 1 has a circular cross-section. An active part 1a of the blade 1 is distributed along a side of the blade which is defined by a plane passing through the axis of the blade.

The active part 1a is made up of a plurality of notches 3 which project from the blade and which are arranged on parallel planes, thereby giving the active part 1a the desired surface roughness. Thus, during a treatment and with the instrument introduced into a periodontal pocket, the active part 1a of the blade 1, i.e., the part provided with a surface roughness, comes into contact with the root surface of the tooth. An opposing part 1b of the blade (shown in Figure 2), i.e., a less aggressive part or even a smooth part, comes into contact with the mucosa. It will be noted that the parallel planes can be inclined with respect to the plane which defines the active part 1a of the blade 1, perpendicular to the axis of the instrument, in order to ensure greater efficacy of the blade.

In accordance with the present invention, the blade 1 is provided with an irrigation channel 4 for receiving a liquid. The channel 4 is arranged at the center of the blade 1, and opens out at the center of the active part 1a of the blade 1 along the major part of its length. This ensures, on the one hand,

cleaning of the active part of the tool during a procedure and, on the other hand, the removal of detached particles, as is explained in greater detail below.

In a preferred embodiment of the present invention, the blade 1 is provided with a plane 6 which intersects with the channel 4 in order to provide the opening 5 of the channel 4 on the active part 1a. This plane of intersection 6 is advantageously inclined with respect to the axis of the blade 1 and defines the active part 1a of the blade 1. The previously described notches 3 (or other similar configuration) are arranged on each side of the opening 5 of the channel 4, providing a surface roughness adequate for use of the instrument.

The end remote from the active part of the blade 1 is provided with a means for detachable fixation to the head. In the embodiment shown, such detachable fixation is accomplished with a bushing 7 which can be maneuvered, in particular, by the practitioner. The blade is integrally connected on the bushing 7 in order to allow the blade 1 to be detached from the head, thereby making the blade interchangeable.

The bushing 7 is additionally provided with an annular groove 8 which, when mounted on the head 2, forms an annular chamber 9. Sealing members 10, 11 are provided on either side of the chamber 9, as is illustrated in Figure 1, for making the annular chamber 9 leak-tight. The annular chamber 9 provides communication between the irrigation channel 4 of the blade 1

and a delivery channel 12 arranged on the head 2. The delivery channel 12 is provided for receiving a liquid such as water, a disinfectant or any other product which is principally intended for irrigating tissues during treatment. It will be noted that the entry point of the liquid can be external to the handpiece, as is illustrated in Figure 1, or internal to the handpiece (not shown).

The head 2 is preferably mounted on an ultrasound-generating apparatus whose ultrasonic vibrations have intrinsic antibacterial properties. Also, by virtue of such vibrations, the blade 1 is able to reach and file the tooth without damaging the residual connective tissue surrounding the tooth.

Use of the instrument of the present invention for performing periodontal treatments will be evident from the above description. The practitioner mounts the instrument onto a handpiece and connects the delivery channel 12 for receiving a desired liquid to an entry point. The face of the active part 1a is then placed in contact with the root surface of the tooth. Vibration of the instrument then brings about a removal of the granulated tissue of the mucous wall of the periodontal alveolus, and surface treatment of the root. Direct irrigation on the blade 1, using the channel 4, permits removal of the resulting debris, providing better visibility of the site for the practitioner.

The end of the blade 1 can be pre-curved, or can be manually shaped by the practitioner, depending on the anatomy of the tooth to be treated. This additionally makes it possible to penetrate the pockets atraumatically, and to more effectively clean plane root surfaces inside larger alveoli.

It will be noted that the length of the blade 1 is similar to that of previously known endodontic files, for example, on the order of 12 to 25 mm in length and having a thickness on the order of 0.1 to 3.0 mm.

Figure 2 shows an alternative embodiment of the instrument for periodontal treatment shown in Figure 1. In the alternative embodiment of Figure 2, the bushing 7 does not pass through the head 2, with the resulting advantage of reducing the number of sealing members to a single sealing member 13.

In yet another alternative embodiment, the blade 1 of the instrument is mounted on the head in an articulated manner, for example, by means of a hinge of the ball-and-socket type, as is schematically shown at 14. This affords the possibility of orienting the position of the active part of the blade with respect to the grip of the apparatus.

It will be appreciated from the foregoing description that the instrument for periodontal treatment of the present invention is relatively simple to produce and permits treatment that is rapid and atraumatic for the patient. In addition, the instrument does not require a surgical intervention, in contrast



to procedures with curettes which, for deep periodontal pockets, require the cutting of flaps.

Although the present invention has been described in connection with two particular embodiments, it will be understood that the present invention also includes all technical equivalents of the described embodiments. For example, while the straight shape which has been described is considered optimal, the shape of the blade could instead be narrowed in the direction of the tip in order to adapt the blade for use inside gingival alveoli. Likewise, the blade can have any suitable cross-section, for example, an elliptical cross-section. It will further be noted that the instrument for periodontal treatment of the present invention can, if appropriate, be disposable.